

Appln. No.: Not Yet Assigned
Amdt. dated February 10, 2006
PRELIMINARY AMENDMENT

IN THE SPECIFICATION

Changes to the specification are as follows.

Please delete the heading "Description:" at page 1, line 2, and insert therefore --
BACKGROUND OF THE INVENTION--.

Please insert the heading "1. Field of the Invention" before the first paragraph of page 1.

Please insert the heading "2. Related Art" at line 9, page 1.

Please delete the paragraph at lines 13-16, page 4, in its entirety.

Please insert the heading "SUMMARY OF THE INVENTION" at line 17, page 4.

Please amend the paragraph beginning at line 18, page 4, as follows:

-- It has surprisingly emerged that a tin-nickel layer forms slowly even if one is not present initially. When the composite multilayer material is heated, as occurs in bushings and bearings made from the composite multilayer material according to the invention, for example, in the running-in phase, nickel diffuses into the overlay consisting substantially of tin. In this way, a higher strength surface slowly forms as a result of the increasing concentration of a second hard phase of copper-tin and/or silver-tin contained in the tin matrix. The reduction in the supporting layer thickness increases fatigue strength.--.

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Please amend the paragraph beginning at line 31, page 4, as follows:

-- In contrast to the prior art, according to which thin nickel layers of 1—3 μm were applied, which served as diffusion barriers, the nickel layer according to the invention forms a nickel source for formation of the initially absent tin-nickel layer. The nickel layer has to be thicker than 4 μm , since otherwise the nickel layer could be completely consumed by the diffusion of the nickel into the tin layer. This would lead to detachment of the top layers now consisting of tin-nickel and the tin overlay alloy. Thicker nickel layers have ~~hitherto~~ been avoided as far as possible, since they do not have good sliding characteristics and are intended, if necessary, to allow wear quickly to reach the bearing metal beneath them.--

Please amend the paragraph beginning at line 12, page 5, as follows:

-- The metals copper and silver may be present separately or in combination in the tin matrix. Their total content should amount to between ~~approx.~~ approximately 0.5 and 20 wt.%. Advantageously, the total content of copper and/or silver should amount to between ~~approx.~~ approximately 2 and 8 wt.%.--

Please amend the paragraph beginning at line 18, page 5, as follows:

-- The overlay should advantageously exhibit a layer thickness of ~~approx.~~ approximately 5 - 25 μm . Layer thicknesses of ~~approx.~~ approximately 4 - 8 μm are preferred for the nickel intermediate layer as are layer thicknesses of ~~approx.~~ approximately 6 - 14 μm for the overlay. With layer thicknesses of these orders of magnitude, it is ensured that neither the nickel layer nor the tin-based overlay is completely converted as a result of diffusion. This would lead to problems of adhesion or

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undesired interactions such as brittle phase formation between the tin contained in the overlay and the bearing metal.--

Please amend the paragraph beginning at line 16, page 6, as follows:

-- The composite multilayer material according to the invention exhibits the great advantage that an interdiffusion layer of tin and nickel forms by itself during running-in under operating conditions of bearings and bushings made from said the multilayer material, said with the interdiffusion layer increasing wear resistance. It does not have to be applied separately in a separate process step. It is possible to encourage the interdiffusion layer to arise by artificial aging of the plain bearings or bushings. For this purpose, heat treatment at ~~approx.~~ approximately 150° - 170°C has proven particularly useful, said with the heat treatment proceeding for two or more hours, to a few days.--

Please insert the heading "DRAWINGS" before the first paragraph of page 7.

Please amend the paragraph beginning at line 4, page 7, as follows:

--Figure 1 shows a section through the a bearing metal layer, nickel intermediate layer and overlay of a composite multilayer material according to the invention;--

Please amend the paragraph beginning at line 9, page 7, as follows:

--Figure 2 shows a section through a bearing consisting of the composite multilayer material according to the invention after the running-in phase; and--

Please insert the heading "DETAILED DESCRIPTION" at line 16, page 7.

Please amend the paragraph beginning at line 17, page 7, as follows:

-- After appropriate pretreatment, a nickel diffusion barrier intermediate layer is applied from a Watt's nickel electrolyte onto a prefabricated bearing of a composite of

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steel and a bearing metal of CuPb22Sn. The A tin-based overlay is electrodeposited onto the nickel intermediate layer produced in this way. The following aqueous-based electrolyte system is used for this purpose:

<u>30 - 45 g/l</u> Sn ²⁺ as tin methanesulfonate,	<u>30 - 45 g/l</u>
<u>2 - 8 g/l</u> Cu ²⁺ as copper methanesulfonate,	<u>2 - 8 g/l</u>
<u>0.1 - 2 g/l</u> Ag ⁺ as silver methanesulfonate,	<u>0.1 - 2 g/l</u>
<u>80 - 140 g/l</u> methanesulfonic acid,	<u>80 - 140 g/l</u>
<u>30 - 45 g/l</u> additive "N" (Cerolyt BMM-T), and	<u>30 - 45 g/l</u>
<u>1.5 - 4 g/l</u> resorcinol.	<u>1.5 - 4 g/l</u>

Tin is used as anode material. The bath temperature for deposition of the overlay is 20 - 40°C. The current density used is 1.5 - 3.0 x 10⁻² A/m². The distance between the anode and the cathode amounts to between ~~approx.~~ approximately 300 and 400 mm. The anode to cathode surface area ratio should be substantially 1:1 (+/-10%). In order continuously to remove Sn⁴⁺ as it arises, the electrolyte has to be circulated via a filtration plant.--

Please amend the paragraph beginning at line 20, page 8, as follows:

-- Figure 2 is a sectional image of a bearing of the composite multilayer material shown in Figure 1 after the operating state has been established, i.e. after the running-in phase. To this end, the bearing was heat-treated for 500 hours at 150°C. The tin-nickel layer of a thickness of 4.1 µm designated 4 has arisen by diffusion, said the layer 4 resulting in a more wear-resistant sliding surface with a greater load carrying capacity. That said, layer 4 is a tin-nickel layer, which is confirmed by the energy-dispersive X-ray analysis results illustrated in Figure 3. The distances on the X axis match the corresponding layer thicknesses in the area III-III of Figure 2. The overlay 1' and the nickel layer 2 now have slightly smaller thicknesses of 10.2 µm and 3.3 µm respectively. The boundary line between the two layers 1' and 4 in Figure 2 is shown clearly as a pale line.--